State of California
California Environmental Protection Agency
Air Resources Board

AIR SAMPLING FOR HEXAVALENT CHROMIUM AND METALS IN BARRIO LOGAN

AIR SAMPLING PROTOCOL FOR MEASURING THE AIR CONCENTRATION OF HEXAVALENT CHROMIUM AND METALS NEAR TWO CHROME PLATING FACILITIES

Monitoring and Laboratory Division

February 7, 2002

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1.0 Sampling Plan Identification and Approval

Title: Air Sampling for Hexavalent Chromium and Metals in Barrio Logan.

Approval: The following sampling plan is recommended for approval by the Monitoring and Laboratory Division.

Signatures:

Kenneth R. Stroud, Chief — Date
Air Quality Surveillance Branch
Air Resources Board

Jeffrey P. Cook, Chief — Date
Quality Management Branch
Air Resources Board

Michael W. Poore, Chief — Date
Northern Laboratory Branch
Air Resources Board

William V. Loscutoff, Chief — Date
Monitoring and Laboratory Division
Air Resources Board

2.0 Project Background

2.1 Previous Near-Source Air Sampling in Barrio Logan

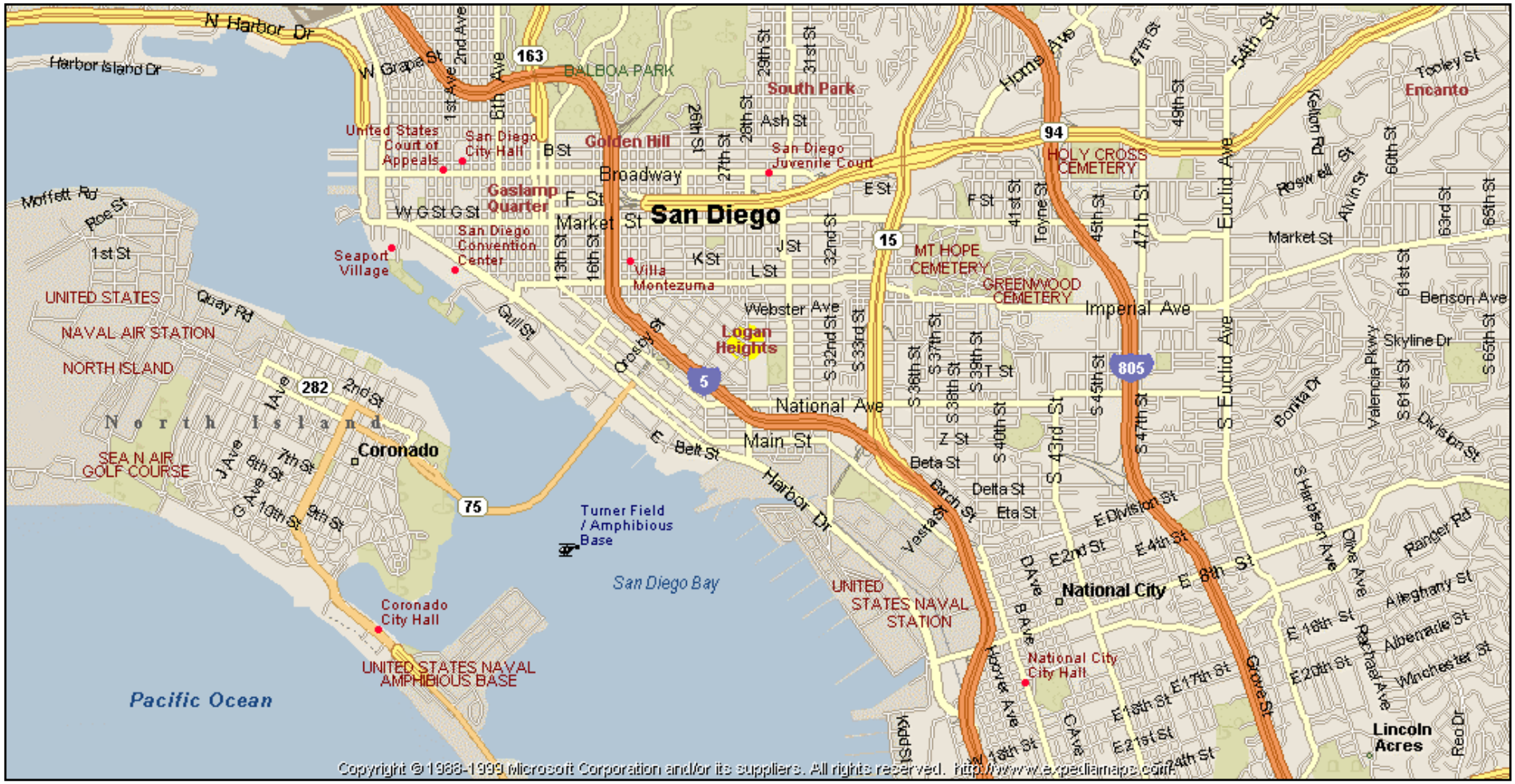
In March 2001, the Stationary Sources Division (SSD) of the Air Resources Board (ARB) requested that the Monitoring and Laboratory Division (MLD) conduct ambient air sampling for hexavalent chromium in Barrio Logan, a community within the Logan Heights area of San Diego (Figure 1). Sampling occurred between May 22 and June 8, 2001, at six sampling sites situated around two chrome platers along a residential-commercial section of Newton Avenue. The purpose was to gather data necessary to evaluate the possible exposure to hexavalent chromium experienced by nearby residents and to collect information needed for revising the ARB's chrome plating Air Toxic Control Measure (ATCM).

Following sample collection and analysis, MLD staff reviewed the arrangement of samplers and determined that optimal air flow to the samplers at four of the six sites may have been obstructed due to walls, trees, and ground vegetation. The hexavalent chromium values obtained during the sampling were therefore suspect in terms of accuracy, precision, and representativeness and were considered questionable for addressing impacts experienced by residents living near the chrome plating operations. In the fall of 2001, the decision was made to conduct additional sampling at the same locations as the May/June sampling, but with greater consideration given to positioning the sampler inlets. A second protocol was drafted, and sampling was conducted between December 3 and December 17, 2001.

Measurements obtained during the December sampling effort were significantly higher than those obtained in May/June. Ambient concentrations measured during December ranged from below the limit of detection (LoD) to 22 nanograms per cubic meter (ng/m3) of sampled air, with an average concentration from all 87 samples collected of 0.98 ng/m3. Because of the high values recorded during December, additional sampling at the same locations was proposed to gain more information on the contribution of the plating operations to the observed values and to determine other possible sources of the emissions. A third sampling effort in Barrio Logan was planned in late January 2002 to occur in early February. The purpose of this protocol is to address the design, schedule, collection methods, and analytical procedures that will be used for the current sampling project. The protocol also describes the data quality objectives, data management, field and laboratory quality control, and reporting procedures.

The current sampling project is more comprehensive than previous near-source sampling in Barrio Logan. Significant differences between earlier sampling (May/June and December) and the current project include:

- Increased number of sampling days (from 13 to 22)
- Increased ambient sampling on weekends (Saturdays and Sundays)
- Addition of source sampling at the hard and decorative plating shops
- Greater temporal resolution in ambient samples (24-hour/12-hour)
- Addition of metals sampling
- Collection of more detailed facility process rate information



Approximate scale: 1"=1 mile

Figure 1
Logan Heights and Surrounding San Diego Area

Details of the May/June sampling are included in the original sampling plan, *Air Sampling for Hexavalent Chromium in Barrio Logan*, dated May 7, 2001. The December sampling is described in *Air Sampling for Hexavalent Chromium in the Barrio Logan Community of San Diego*, dated December 7, 2001 (revision). The analytical results and from the December sampling are given in Appendix A-1.

2.2 Goals and Objectives for Current Project

The goals of the current sampling project are: 1) to obtain more information on the possible connection between the values recorded in December and the chrome plating operations on Newton Avenue in Barrio Logan and, 2) to determine what other sources may be contributing to the high values measured in December.

The overall sampling objectives of the project are to sample for 22 days at 6 ambient and 2 in-facility sites to obtain 211 valid hexavalent chromium samples and 51 valid airborne metals samples. In-facility sampling at 1 of the facilities (Carlson & Beauloye) will be conducted as a component of source sampling scheduled for 6 days in February (1). Since the control technology used at the second plating shop (Master Plating) precludes the use of traditional source sampling methods, a minimum of 7 days of 8-hour, in-facility samples for hexavalent chromium and airborne metals will be obtained within the second plater in lieu of source sampling. Specific data quality objectives for the project are described in Section 6.0 of this protocol.

3.0 Roles and Responsibilities

3.1 Air Resources Board

MLD and SSD are the divisions in ARB with overall responsibility for the Barrio Logan hexavalent chromium air sampling project. MLD will plan and conduct the monitoring, perform all analyses, and address all associated quality control and quality assessment activities. SSD will use monitoring data, in conjunction with data obtained from other sources, to evaluate the effectiveness of the current ATCM for controlling hexavalent chromium emissions from chrome plating shops in areas with nearby residences.

Primary ARB management contacts for the project are listed below with an explanation of the primary functions their respective sections will be performing.

- Dan Donohue, Chief
  Emissions Assessment Branch
  Stationary Source Division

- Todd Wong, Manager
  Technology Assessment Section
  Project Assessment Branch

Staff of the Technology Assessment Section (TAS) will be the primary contact group for communication between SSD and MLD and will coordinate meetings between ARB staff and the San Diego County Air Pollution Control District. TAS staff will collect historical plating data and compliance information from chrome plating operations (Carlson & Beauloye and Master Plating) and will provide the information to staff of the Operations Planning and Assessment Section (OPAS) to be included in the final project report. TAS staff will also coordinate any ancillary sampling and analysis of material that may impact air results during the course of the project (e.g., soil sampling near the chrome plating facilities) and will provide any analysis data to OPAS following appropriate analysis.

- Jeffrey P. Cook, Chief
  Quality Management Branch
  Monitoring and Laboratory Division

- Webster Tasat, Manager
  Operations Planning and Assessment Section
  Quality Management Branch

OPAS will have overall project responsibility for MLD. In conjunction with the Special Purpose Monitoring Section (SPMS), OPAS will assist in selecting sampling sites and coordinating sampling activities with appropriate community representatives. OPAS will coordinate activities between SPMS, NLB, and any outside laboratory involved in comparative analytical work. OPAS staff will prepare the sampling plan and will prepare the sampling report issued to SSD. OPAS will also track samples, validate preliminary results, and conduct the primary analysis of data generated during the project.

- Kenneth R. Stroud, Chief
  Air Quality Surveillance Branch
  Monitoring and Laboratory Division

- Dennis Goodenow, Manager
  Special Purpose Monitoring Section
  Air Quality Surveillance Branch

SPMS will have responsibility for installing, operating, and removing all samplers and other instruments from the sampling locations. The SPMS will be responsible for arranging for the transport of all sampling media to and from the sampling sites and will collect plating and other operational data from the plating facilities on each sampling day. Plating data will be in the form of elapsed amp-hours from all chrome electroplating tanks used at each plating facility. SPMS staff will conduct all field quality control (QC) activities and will provide OPAS staff with sampler QC data and confirmation that the sampling plan was followed. SPMS staff will provide OPAS staff with all data sheets and data collection information (including meteorological data) after all sampling is complete.

- Michael Poore, Chief
  Northern Laboratory Branch
  Monitoring and Laboratory Division

- Russell Grace, Acting Manager
  Inorganics Laboratory Section
  Northern Laboratory Branch

The Inorganics Laboratory Section (ILS) will have responsibility for preparing and supplying all sampling media to SPMS staff and will perform all laboratory analyses. ILS staff will provide appropriate laboratory information to OPAS, including the date and number of filters released and returned from the field, sampling dates and locations, sample hold time, date of analysis, analysis results (including units), and any notable inconsistencies (e.g., samples returned without validating flow rate information, etc.). ILS staff will conduct the initial check of the filter and sampling data as it is received from the field to establish the validity of the sample. ILS staff will enter information from samples received from the field in the Laboratory Information Management System (LIMS).

3.2 San Diego County Air Pollution Control District

The San Diego County Air Pollution Control District (SDCAPCD) will assist in the sampling project by operating one additional sampler (XonTech 920 multi-channel) to be used to sample air concentrations of hexavalant chromium and metals within Master Plating. In cooperation with the facility operator, SDCAPCD personnel will determine the placement of the 920 within the facility. ARB (SPMS) staff will provide hexavalent chromium and metals filters for the 920 to SDCAPCD personnel on or before each day of sampling. SDCAPCD personnel will sample within Master Plating over seven days from February 7th through February 15th. SDCAPCD personnel will perform all calibrations, flow checks, and maintenance procedures for the 920 used in the project. All filter analyses (hexavalent chromium and metals) will be performed by ARB's laboratory in Sacramento. ARB (SPMS) staff will coordinate transport of the exposed filters to Sacramento via overnight delivery. SDCAPCD personnel may also collect hourly ampere-hour readings from each facility to document plating activity. The primary SDCAPCD contact for the project is listed below:

- Mahmood Hossain, Senior Air Pollution Chemist
  San Diego County Air Pollution Control District

4.0 Sampling Design and Method

4.1 Sampling Sites

As with the May/June and December sampling, the selection of sampling sites for this project is based primarily on the location of receptors and their proximity to the chrome plating facilities and expected meteorological conditions at the time of sampling. To the extent possible, all samplers will be positioned with reference to microscale monitoring siting criteria in 40 CFR

Part 58, Appendix E, and Volume II of ARB's Quality Assurance Manual (Table 1)(2). Siting criteria will apply to ambient single sampler, collocated, and parallel sites. If it is not physically possible to meet a particular siting requirement, every effort will be made to ensure that the sampler inlet is placed so as to minimize airflow obstructions. The pattern of samplers will be in an upwind-downwind circular arrangement around the chrome platers on Newton Avenue near South Evans Street in the same locations as the May/June and December sampling (Figure 2).

Proposed locations for samplers are as follows: three samplers will be placed in the front yard at 2121 Newton to collect hexavalent chromium (12-hour and 24-hour samples) and metals (24-hour samples). One sampler (24-hour hexavalent chromium) will be placed in

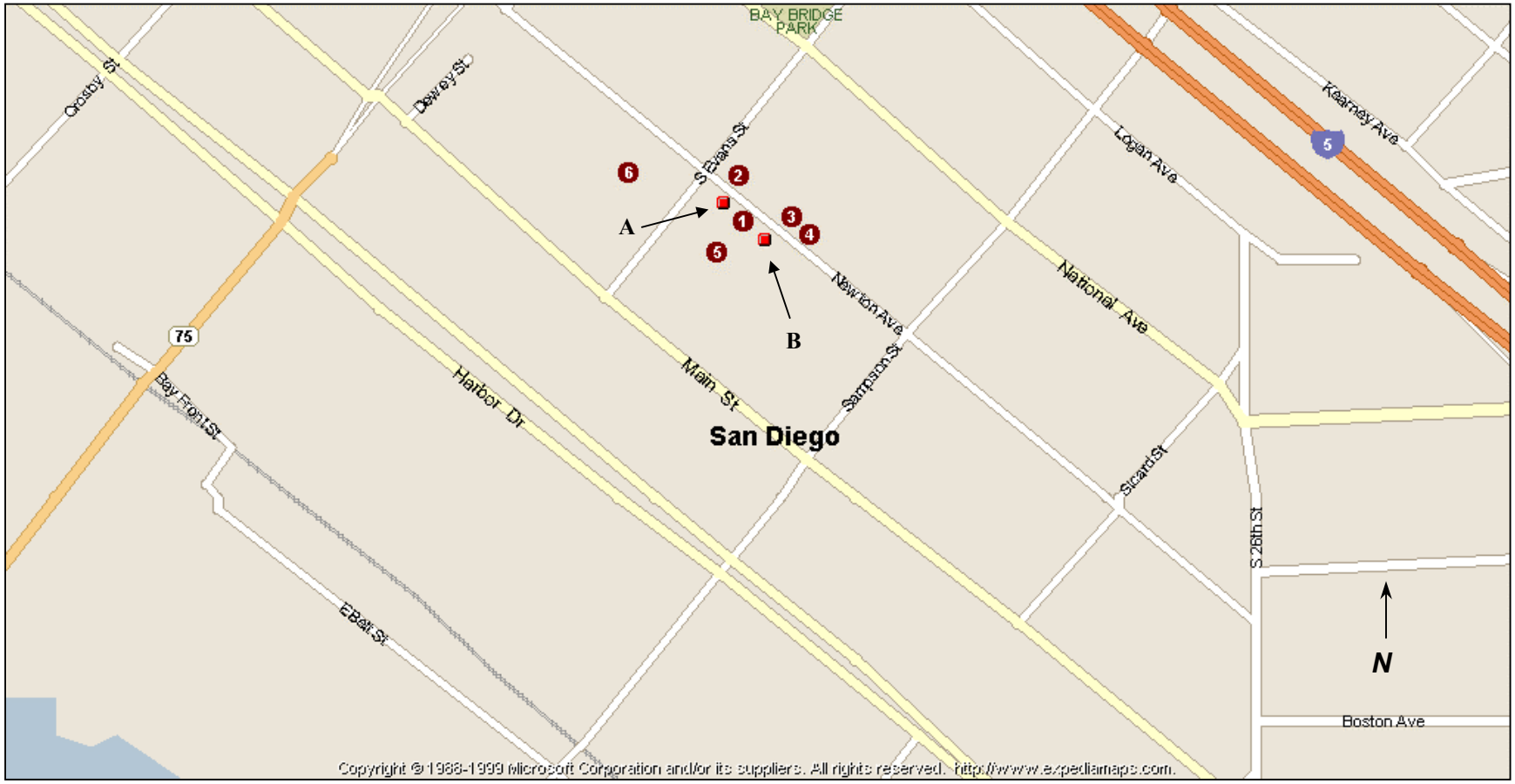
Table 1
Microscale Monitoring Requirements for Low-Volume PM Samplers

Item / Influence	Requirement*
Height of Inlet	2 to 7 meters above ground level.
Spacing Between Inlets (Collocated Samplers)	Within 4 meters, but at least 1 meter apart.
Obstacles	Distance between sampler and obstacle must be at least 2 times the height the obstacle protrudes above the sampler.
Tree Dripline	Inlet must be 10 meters from dripline if tree represents an obstruction.
Walls, Parapets, etc.	Inlet must be 2 meters from walls, parapets, etc.
Air Flow Arc	Unrestricted 270º arc that must include predominant wind direction for seasonal high pollutant; samplers located on the side of a building require 180º clearance.
Traffic	5 to 15 meters from roadway.

** From 40 CFR Part 58, Appendix E, and ARB Quality Assurance Manual, Volume II, Section 2.0.4 (February 2000).*

the front yard of 2144. Two samplers (12-hour and 24-hour hexavalent chromium) will be placed at 2152 Newton. Two collocated samplers (24-hour hexavalent chromium) will be placed within a vacant lot on the north side of Newton Avenue to the west of 2144 Newton. Two samplers (24-hour hexavalent chromium and 24-hour metals) will be placed along the north side of the alley behind the plating facilities, due south of the residence located at 2121 Newton Avenue. One sampler (24-hour hexavalent chromium) will be placed at the Mercado Apartments northwest of the plating facilities. One sampler (8-hour hexavalent chromium) will be operated within Carlson & Beauloye on each of six days during the source sampling. Table 2 summarizes the placement of samplers.

A portable meteorological station will be placed at the vacant lot on the north side of Newton Avenue near the collocated samplers. Ambient temperature, wind speed, wind direction, and relative humidity will be measured continuously and reported in hourly averages. The standard deviation of the horizontal wind direction (sigma-theta) will be calculated and reported in hourly averages. A wind rose plot of wind data collected from Logan Memorial Academy during the Barrio Logan Toxics Monitoring Project in February 2000 shows the expected wind pattern expected during the current ambient sampling (Figure 3).



Approximate map scale: 1" = 1/12 mile. All sampling locations are approximate.

Chrome Platers

A = Master Plating (Decorative Chrome), 2109 Newton
B = Carlson & Beauloye (Hard Chrome), 2141 Newton

Proposed Ambient Sampling Sites

1 = 2121 Newton Avenue
2 = Vacant Lot (collocated + met station)
3 = 2144 Newton Avenue
4 = 2152 Newton Avenue
5 = Alley
6 = Mercado Apartments

Figure 2
Proposed Sampling Locations and Chrome Platers on Newton Avenue

Table 2
Sampler Placement Chart

	Sampler Interval / Type				
Proposed Sites	*24-hour Cr^{6+}*	*12-hour[1] Cr^{6+}*	*8-hour[2] Cr^{6+}*	*Collocated[3]*	*Metals*
2121 Newton	x	x			x
2144 Newton	x				
2152 Newton	x	x			
Vacant Lot	x			x	
Alley	x				x
Mercado Apts.	x				
C&B[4] / MP[5]			x		

[1]12-hour samples should be operated during daylight hours (e.g., 6 am – 6 pm). Collection of plating tank amp-hours will occur at the beginning and end of each sampling day the facilities are in operation. LoD for 12-hour sample = 0.4 ng/m3.
[2]XonTech 920 operated by SDCAPCD for in-facility air sampling of Cr^{6+} and metals at Master Plating on weekdays February 7th-15th. ARB sampling for Cr^{6+} at Carlson & Beauloye will be coincident with source sampling February 11th, 12th, 19th, 20th, 25th, and 26th. LoD for 8-hour sample = 0.6 ng/m3.
[3]Cr^{6+} collocated sampler operated on a 24-hour interval.
[4]Carlson & Beauloye.
[5]Master Plating.

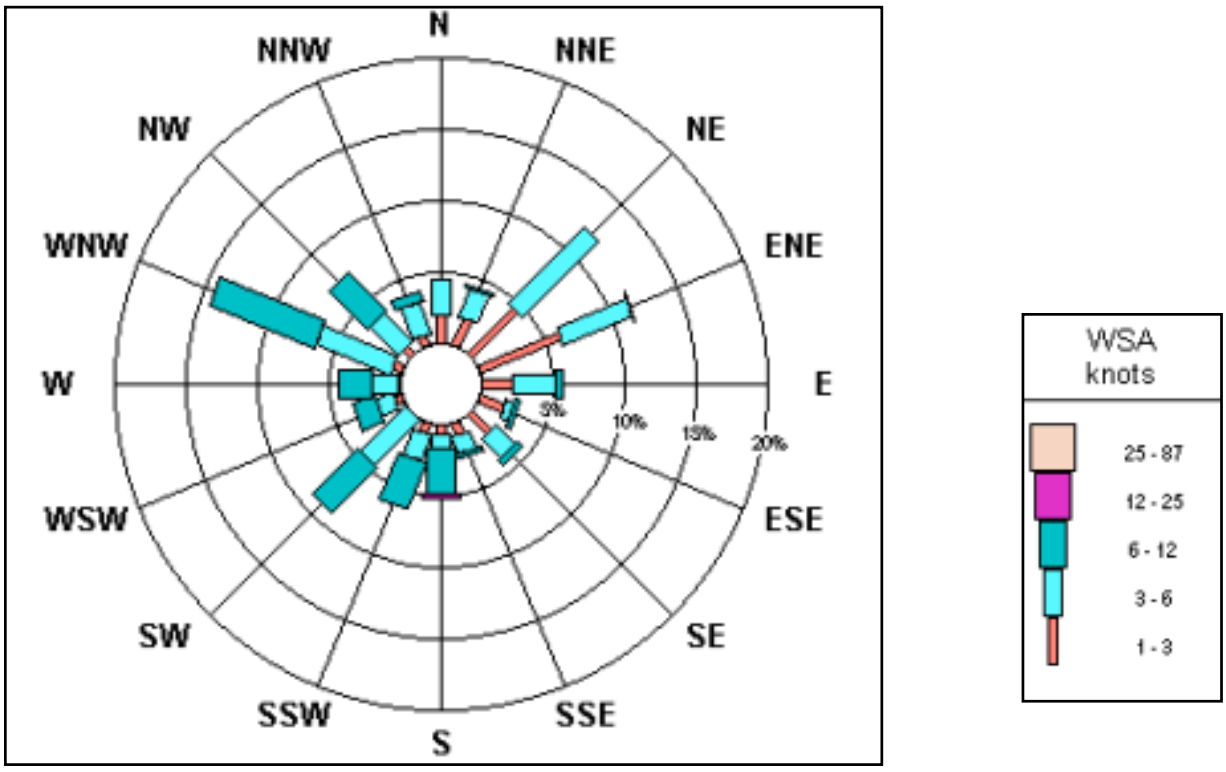
4.2 Duration and Interval

Ambient sampling is scheduled each day for approximately 22 days beginning February 5th through February 26th and will include three weekends (Saturdays/Sundays). The sampling duration will vary among the sites according to Table 2. The sampling schedule is designed to ensure that ambient sampling occurs on at least two days when no plating is taking place at either facility. Non-plating days may coincide with the February 18th holiday and on Saturdays and/or Sundays. The ambient sampling schedule is summarized in Figure 4.

All 24-hour samples collected for this project will be coincident with one another (i.e., sampling will be conducted on the same day with the same start-times and end-times within two hours of each other). The purpose of coincident sampling is to obtain a 24-hour profile of hexavalent chromium/airborne metals impact at selected sites around the chrome plating facilities.

4.3 Equipment

Sampling equipment used for the project will consist of a total of 12 BGI PQ-100 samplers, custom tripods, battery cases, and one Auto Met meteorological station. Each BGI sampler is a single-filter, battery-powered unit capable of 24 hours of continuous operation. Tripods will be used to elevate the inlet of selected samplers to a minimum of two meters above the ground. The meteorological station is battery-powered. Line power may be used, if available, for the BGI samplers and/or the Auto Met station. Each sampler is operated at a nominal flow rate of



Average 24-Hour Wind Pattern for February 2000 as measured at Memorial Academy during the Barrio Logan Toxics Air Monitoring Project from October 1999 - March 2001

Figure 3
Average Wind Rose for Barrio Logan (February 2000)

February 2002

Su	M	Tu	W	Th	F	Sa
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28		

Note: Source sampling and in-facility emissions sampling at Carlson & Beauloye will occur on the 11th, 12th, 19th, 20th, 25th, and 26th. In-facility emissions sampling at Master Plating will occur on the 7th, 8th, 11th, 12th, 13th, 14th, and 15th.

Figure 4
Ambient Sampling Schedule

10 standard liters per minute (slpm). The flow rate is pre-set and is maintained with a mass flow controller. A 10 slpm flow rate ensures that enough air is drawn through the sampler during each 12- or 24-hour period (7.2 m3 or 14.4 m3) that hexavalent chromium or metals will be detected, if present.

Details on sampler operation and maintenance for the BGI PQ-100 Air Sampler are available at the manufacturer's web address: http://www.bgiusa.com/aam/pq100v61.pdf. Operational details regarding the XonTech 920 sampler to be used by SDCAPCD for in-facility sampling are available in Appendix R, Volume II, of the ARB's Quality Assurance Manual at http://www.arb.ca.gov/aaqm/qmosqual/qamanual/vol2/v2apxr.pdf.

Whatman #41 37-millimeter cellulose fiber filters (20-25 µm pore size) are used for sampling hexavalent chromium. For sampling metals, Whatman 37-millimeter PTFE (or equivalent) filters (0.5 µm pore size) will be used. After laboratory preparation, all filters are mounted in plastic filter cassettes/snap rings and stored in petri dishes for transport to the field. Filter-loaded rings are placed in filter holders and attached to the inlet of each sampler. Filters used for sampling and those used as trip blanks will be prepared, handled, and transported under the same conditions. Sections 5.0 and 8.0 of this sampling plan describe the preparation and use of sampling filters and trip blanks for the project.

4.4 Collocated Sampling

Collocated sampling is conducted to establish or verify the total system precision. Each sampler of a collocated pair is operationally identical and is run under the same conditions. The concentration values are then compared. Precision measurements are an important quality assessment technique and are used to validate the sampling design. To verify the precision of the BGI sampler, a collocated pair will be operated at the vacant lot on the north side of Newton Avenue on each sampling day. Each sampler will have the approximately the same start and end times, total run time, and will be situated with reference to collocated sampling criteria set forth in 40 CFR, Part 58, Appendix A, and Volume II of ARB's Quality Assurance Manual.

4.5 In-Facility Emission Sampling

In-facility emission sampling will occur on each source sampling day at Carlson & Beauloye and each weekday from February 7th through February 15th at Master Plating. The in-facility sampling is part of the emissions test at Carlson & Beauloye and will supplement emission information collected at the stack. Sampling within Master Plating will be used to estimate mass emission rates from the facility.

In-facility sampling at Carlson & Beauloye will be conducted using the same type of sampler used for ambient sampling (BGI PQ-100) and will consist of collecting hexavalent chromium samples only. In-facility sampling at Master Plating will be conducted by SDCAPCD using a XonTech 920 sampler that is configured to collect both hexavalent chromium and metals samples simultaneously. The 920 collects total suspended particulate at a nominal flow rate of 10 slpm.

5.0 Sample Collection and Analysis

5.1 Filter Preparation

Prior to shipment to the field, ILS staff will prepare filters for hexavalent chromium and metals sampling. Each filter is briefly inspected prior to release from the lab for contamination or damage. Contaminated or damaged filters are rejected for sampling.

As with the May/June and December sampling, trip blanks will be included in the filters returned to ARB's laboratory for analysis (one trip blank per filter type per day).

5.2 Sampling Procedure

The target flow rate of each sampler (10 slpm) will be checked before any sampling with a certified flow transfer standard. A flow-verification will also be performed on each sampler at the completion of the project. Pre- and post-sampling flow check information is recorded on a sampler flow check log (Figure 5).

Following pre-sampling flow checks, a filter will be loaded into each sampler. The start date and time are entered into each sampler's microprocessor. After approximately 12 or 24 hours, each sampler will automatically stop. Elapsed time, target flow rate, and other sampling information are noted on a daily Sample Report (Figure 6). Complete operating information stored in the sampler's microprocessor will be downloaded each day on a laptop computer. For each valid sampling day, staff of SPMS, TAS, and SDCAPCD will collect amp-hour and activity information from Carlson & Beauloye and Master Plating (Figure 7).

Prior to loading a new filter into a sampler, the sampler is checked and any necessary on-site maintenance is performed. Unexposed filters are stored in a protected, dry location in individual petri dishes until loaded into a sampler. All data from each sampler's data logger are downloaded after each sample run into a laptop computer. The data are later printed out for review by ILS staff to review and validate each sample run. After each sample run, exposed filters are placed in individual petri dishes labeled with the sampling date and location and are placed in a plastic bag protected from contamination. The filters are stored under ambient conditions until returned to the laboratory. For this project, each day's filters will be transported via overnight express delivery to Sacramento for analysis. Each set of filters sent to Sacramento for analysis will include a hexavalent chromium filter blank and a metals filter blank. The Sample Reports, including sample transfer documentation, will accompany samples when they are returned from the field.

In the event of rain at the time of daily filter retrieval and replacement, sampling will be suspended until clear conditions resume. Make-up samples will be taken as necessary during clear (non-rain) conditions in order to meet the overall data completeness objective in Section 6.3.

Sampler Flow Check Log

Transfer Standard Information:

*MFM Make & Model:*_____ *Flow Range:*_____

*I.D.(Bar Code):*_____ *Calibration Date:*_____

Flow Check Data:

		Pre-Sampling Flow Check		Post-Sampling Flow Check		
Date	Sampler I.D.	Transfer Standard Flow Rate (slpm)	Sampler Flow Rate (slpm)	Transfer Standard Flow Rate (slpm)	Sampler Flow Rate (slpm)	Comments

Figure 5
Flow Check Form

Sample Report

*Site Name:*_____ *Filter I.D. or Code:*_____

*Sampler I.D.:*_____ *Start Date / Time:*_____

*Field Operator:*_____ *End Date / Time:* _____

Sample Summary:

Elapsed Time (min)	Target Flow Rate (slpm)	Total Volume Sampled (liters)	Observed Conditions

Observed Conditions

A. No Unusual Conditions
B. Rain / Snow
C. Fog
D. Nearby Smoke / Fire
E. Construction
F. Sampler Malfunction
G. Other (state)

Operator Comments:

_____

_____

_____

Filter / Sample Transfer:

Action	Date	Time	Initials		Comments
			Released	Taken	
Filter transferred from lab to site operator					
(Filter transfer)					
(Filter transfer)					
(Filter transfer)					
Filter transferred from site operator to lab					

Figure 6
Sample Report Form

Chrome Plater Ampere-Hours

Carlson & Beauloye

Date	Time	Plating in Progress?	Amp-Hour Meter (Tank #1)	Amp-Hour Meter (Tank #2)

Comments (Note any air agitation of chrome tank solution ('sparging')):_____

_____

Master Plating

Date	Time	Plating in Progress?	Amp-Hour Meter (Tank #1)

Comments (Note any air agitation of chrome tank solution ('sparging')):_____

_____

Figure 7
Ampere-Hour Usage Form

5.3 Laboratory Analysis

Upon receipt of exposed filters, ILS staff will log filters into MLD's Laboratory Information Management System (LIMS) for tracking through the analysis, validation, and verification process. Information on sampling date, location, interval, and flow rate are entered into LIMS, and the filter is inspected for contamination, tears, holes, etc.

Valid hexavalent chromium filters undergo extraction with deionized water and the extract is run through an ion chromatograph. The ARB's published limit of detection (LoD) for hexavalent chromium analysis (based on a 24-hour sample collected at 10 slpm) is 0.2 ng/m3 and has been verified through multiple runs of hexavalent chromium standard through an ion chromatograph. Additional information on the analytical method for hexavalent chromium, including method sensitivity and precision, is described in the laboratory Standard Operating Procedure (SOP) for MLD Method 039. A summary of Method 039 is available online at http://www.arb.ca.gov/aaqm/sop/summary/sop039.htm. Detailed information may be obtained from the ILS acting manager, Mr. Russell Grace, at (916) 322-8959.

Metals filters will be analyzed using Inductively Coupled Plasma Mass Spectrometry (ICP-MS). ICP-MS typically allows for the detection of very low levels (i.e., sub-ppb) of multiple elements, including chromium, nickel, and lead. The SOP for ICP-MS, MLD Method 061, is currently under review. General information regarding Method 061, including LoDs and laboratory quality control, may be obtained from ILS.

6.0 Data Quality Objectives

6.1 Precision and Accuracy

Precision is the agreement between replicate measurements of the same property under the same conditions. Accuracy is a measure of how close an individual measurement is to the actual value. For the current project, 24-hour sampler precision will be assessed through the use of collocated samplers at the vacant lot. For hexavalent chromium analysis, analytical precision will be expressed as the relative percent difference (RPD) between two replicate analyses made on a sample extract. A minimum of 10 percent of extracts from all valid samples will undergo two replicate analyses, and the RPD will be calculated. Extracts from trip blanks will be analyzed using the same procedure as sample filters. Trip blank analysis will provide baseline values, if present, that may be used to correct analytical results.

The accuracy of Method 039 will be assessed through the percent recovery of samples spiked with a National Institute of Standards Technology (NIST)-traceable stock solution of hexavalent chromium. ILS practice requires all hexavalent chromium analyses of laboratory-spiked samples demonstrate recovery of the spiked value ± 20 percent.

Details on the accuracy and precision of Method 061 (ICP-MS) may be obtained from the ILS acting manager.

6.2 Representativeness

Representativeness for this project refers to how accurately the sampling design represents the impact of hexavalent chromium on residents surrounding the chrome plating facilities. The number of sites, their location encircling the plating facilities, and the sampling duration and interval address the spatial and temporal representativeness. The sampling configuration, coupled with meteorological measurements and verification of chrome plating operations during sampling, will help identify the source-receptor connection. Plating verification may include obtaining SDCAPCD inspection records (i.e., ampere-hour logs) for each plating operation and contacting individual platers for specific process information.

6.3 Completeness

Data are complete if a prescribed percentage of the intended measurements are obtained. The total intended number of valid samples (including collocated and in-facility samples) is 211 (assumes 22 days of sampling with six days of in-facility samples collected from Carlson & Beauloye and 7 days from Master Plating). The overall data completeness objective is to obtain a minimum of approximately 90 percent of the total intended valid samples. If less than 190 valid hexavalent chromium samples and 46 valid metals samples are obtained, make-up runs will be conducted until a sufficient number of samples are obtained to meet a satisfactory level of data completeness.

For purposes of this project, valid samples are defined as samples that meet criteria for sampler-flow verifications, filter preparation, sample collection and review, DQOs, and laboratory analysis.

6.4 Comparability

Data are comparable if they are collected using the same sampling protocols and analytical methods. Comparability among sample sets for this project requires that the same sampling methods and procedures, analytical techniques, and reporting units used for sampling hexavalent chromium and metals be used for the duration of the project. For this project, all samplers used will be the same make and model and will be operated at the same flow rate, with the exception of the sampler used for in-facility sampling at Master Plating. MLD has operated the BGI and 920 in parallel in other special monitoring projects and has comparability data.

6.5 Coincident Sampling

A sample is defined as coincident if it is collected on the same day with start or end times within approximately two hours of the coincident sample. All 24-hour samplers during the project will be run coincident with one another; 12-hour samplers will be operated coincident other 12-hour samplers. Any sample run that is not coincident with other comparable sampling runs in terms of the start/stop time will be invalid for purposes of evaluating data completeness.

7.0 Data Tracking, Validation, and Verification

Data tracking involves frequent review of sample collection, transfer, log in, and analysis to ensure that any problems that may develop are identified quickly and corrective action is taken. Validation is the process by which specific criteria (e.g., sampler calibration requirements, etc.) are applied to samples or laboratory measurements by site operators, laboratory personnel, or data analysts to determine if the data is usable. Verification refers to a review of the data at all stages of transfer and recording to ensure that errors are not made and all data meets a qualitative standard of reasonableness.

MLD staff will track samples from collection through analysis. In particular, SPMS and ILS staff will apply standard validation and verification criteria to all samples as required by field and laboratory SOPs. Data identified as invalid will not be reported or used for any other purpose.

8.0 Quality Assessment / Quality Control

Field and laboratory QC procedures are critical to ensuring that data collected are consistent, relevant, and defensible. The ARB's standard field and laboratory QC procedures will be used for the project and are contained in field and laboratory SOPs. All QC data, with appropriate explanation, will be included in any final report.

8.1 Flow Verification and Equipment Calibration

The flow rate of each sampler will be checked and adjusted, if necessary, at the beginning of the project using a National Institute of Standards Technology (NIST)-traceable transfer standard. Additional flow verifications using a NIST transfer standard will also be conducted on each sampler at the end of the project. The purpose of flow checks is to verify that the sampler flow rate is a nominal 10 slpm. Meteorological equipment (Auto Met) will be calibrated using NIST-traceable standards, where appropriate, prior to deployment.

A description of transfer standard calibration is detailed on the ARB's website at http://www.arb.ca.gov/aaqm/qmosprog/stdslab/stdslab.htm and through documentation from MLD's Program Evaluation and Standards Section (PE&S).

8.2 Analytical Quality Control

For the analysis of hexavalent chromium by ion chromatography, laboratory QC procedures include the use of filter blanks, extract (water) blanks, and spiked filters. Replicate analyses are routinely run on 10 percent of each sample batch for QC purposes.

A description of laboratory QC procedures for ICP-MS is available from the ILS acting manager.

Details on laboratory QC procedures, instrument calibration procedures, analysis sensitivity, and precision are included in the laboratory SOP and quarterly QC reports generated by the ILS and

reviewed by management and an independent group within MLD (PE&S) to ensure that analyses are performed within pre-established limits.

8.3 Corrective Action

Samples that do not meet validation criteria for sampler calibration, sampling interval, filter integrity, or any DQO outlined in Section 6.0 will be considered invalid and will require make-up samples. All make-up runs will be conducted according to the same methods, procedures, DQOs, and laboratory QC standards required during the original sampling.

9.0 Reporting

Every effort will be made to provide ambient data to SSD, the Planning and Technical Support Division (PTSD), and SDCAPCD two weeks after receipt of the filters by ILS. At the completion of the project, all data will be compiled and MLD will provide a final monitoring report to SSD. The final report will include a review and explanation of the project's goals, the sampling design and method, the types and results of analyses conducted, and the means of data validation. A summary will also be given of all associated sampling and laboratory quality control. The draft final report will undergo internal MLD review, then be presented to SSD and all other interested parties.

10.0 References

1. Details on the applicable source sampling method, including quality assurance elements, may be found in the source test protocol, *Carlson & Beauloye Chromium Source Test*, *Project Number T-02-003*, February, 2002, and at the following ARB web site: http://www.arb.ca.gov/testmeth/vol3/M_425.pdf.

2. 40 CFR, Part 58, Appendices A and E.

Appendix A-1

Analytical Results from December 2001 Sampling

Barrio Logan Hexavalent Chromium Air Sampling Results[1]
December 2001

Date	2121 Newton	2144 Newton	2152 Newton	Alley	Mercado Apts.	Vacant Lot (primary)	Vacant Lot (collocated)
12/03/01	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	Inv.
12/04/01	0.2	<0.2	<0.2	0.5	<0.2	<0.2	<0.2
12/05/01	1.9	<0.2	0.3	0.6	Inv.	<0.2	<0.2
12/06/01	3.8	0.2	0.2	0.3	<0.2	<0.2	<0.2
12/07/01	9.3	7.9	4.8	1.3	0.3	3.6	3.2
12/08/01	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	Inv.
12/10/01	<0.2	0.8	1.5	<0.2	<0.2	<0.2	<0.2
12/11/01	<0.2	Inv.	<0.2	4.0	0.3	<0.2	<0.2
12/12/01	0.2	<0.2	<0.2	6.9	1.0	<0.2	<0.2
12/13/01	2.4	<0.2	<0.2	22.0	0.5	<0.2	<0.2
12/14/01	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
12/15/01	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
12/17/01	0.3	0.4	0.5	<0.2	<0.2	<0.2	<0.2

[1] All values in ng/m3. LoD = 0.2 ng/m3